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ABSTRACT

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Project Access Research Report No. 2
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Ronald L. Flaugher

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EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY
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PROJECT ACCESS RESEARCH REPORT #2

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Abstract

Among the four participating ethnic groups in Project Access for Los Angeles (Black, White, Mexican-American, and Oriental), the patterns of test performance that emerged were surprisingly similar to those from two previous studies of first-grade children, even though Access involved eleventh graders. Partially replicated was the finding that overall level of performance varied with social class, while the patterns remained rather constant within ethnic group, regardless of social class.

This new evidence adds to the strength of the argument that our educational systems should be attending to, and utilizing, the variety of talents and aptitudes presented by the students, rather than attempting to treat everyone as a member of the majority group.

PROJECT ACCESS RESEARCH REPORT #2

Patterns of Test Performance by High School Students of Four Ethnic Identities[1]

"Ethnicity does affect the pattern of mental abilities and, once the pattern specific to the ethnic group emerges, social-class variations within the ethnic group do not alter this basic organization (Stodolsky & Lesser, 1967, p. 567)."

This is a concise statement of the findings which prompted the data analysis reported here. The quoted passage is from the second of two studies of the interaction of mental ability patterns and ethnic identity. The first study (Lesser, Fifer, & Clark, 1965, hereafter designated "L.F.& C.") was an examination of four types of test performance (Verbal Ability, Reasoning, Number Facility, and Space Conceptualization) in first-grade children from four ethnic groups (Chinese, Jewish, Negro, and Puerto Rican). Each ethnic group was divided into two social-class groups (middle and lower), and each of these in turn was divided into equal numbers of boys and girls. A total sample of 320 children from New York City and environs participated in this first study.

The study found distinctive characteristic patterns of performance among the four ethnic groups; when the ethnic groups were divided by social class the patterns remained and only the levels of ability changed.

The second study (Stodolsky & Lesser, 1967) was essentially a replication of the first, but in another city. First-grade children from Boston

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[1]Project Access Research Report Number One is entitled "Reactions to a very difficult test by an inner-city high school population: A test and item analysis," by Ronald L. Flaugher and Lewis W. Pike. Research and Development Report RDR-69-70, No. 4, June 1970.

were used this time, and the same measures were applied, with the result that the same patterns that had been established in the New York City study emerged once more. Again, the influence of social class also showed results similar to the previous study, in that the level of performance was lower in each of the ethnic groups for those children from the lower social class; however, regardless of social class, the pattern characteristic of that ethnic group remained.

The Present Analysis--Study I

Project Access is a program sponsored by the College Entrance Examination Board and funded by the Ford Foundation. The basic goal is to provide access to postsecondary education for minority/poverty students, while applying the knowledge gained in this endeavor to other testing and measurement activities that affect these students. In the 1969-70 school year, a nine-test Project Access battery was administered, together with a Biographical Inventory, to approximately 18,000 junior-year students in three cities: Los Angeles, Memphis, and Washington, D. C. Not all schools in each city participated. They were chosen within the city on the basis of interest and willingness to participate.

As part of the statistical analysis of data that resulted from this administration, the methodology from the L.F.& C. study described above was approximated as nearly as possible, in an attempt to take advantage of the ethnic mix of the Project Access participants, and to extend the study of the interaction of test performance with ethnic identity.

Method

The sample. The data from the city of Los Angeles were particularly well suited to the further exploration of ethnic group performance, because four separate groups were found to be present in sufficient numbers to justify this sort of analysis. Table 1 shows the options that were available to the student on the ethnic identity item in the Biographical Inventory and the manner in which the students responded. It can be seen that rather large numbers of students either did not respond to the item or gave multiple responses. They were excluded from the analysis. From these data, the Black, White, Mexican-American, and Oriental groups were selected for further analysis.

Insert Table 1 about here

Comparison with standard scores. Some statistical adjustments were necessary in order to make the Project Access data comparable to that of L.F.& C. That study utilized carefully selected samples of equal size from each ethnic group, sex, and social class. By determining the normalized standard score for each child, based on his performance in comparison with all other children in the group of 320, it was a simple matter to obtain statistics on any desired recombination of the groups and subgroups.

The Project Access data, on the other hand, consisted of groups that differed greatly in size, making it inappropriate to utilize standard scores, since this would imbalance the overall mean toward the mean of the largest group. Therefore, in order to make a comparison possible the group means for each test in the Access battery were transformed to a new scale on which each of the four group means were weighted equally. The mean of these four

Table 1

Options and Responses for Los Angeles Students

for the Item "How Do You Describe Yourself"

	Male	Female	Total[a]
American Indian	23	24	49
Black, Afro-American, Negro	1211	1923	3164
White	155	151	312
Mexican-American, Brown	512	562	1094
Oriental	207	200	411
Puerto Rican	17	13	31
Spanish American	53	62	116
Undesignated[b]	1648	1138	2861

[a]"Total" equals number of males plus number of females plus number of students who did not indicate sex.

[b]"Undesignated" includes both no responses and multiple responses.

group means was made to be equal to 50, and the total standard deviation was scaled to be equal to 10. These "balanced" mean values, then, permitted the relative performance of each of the groups to be examined on any particular test, as well as across tests, and such a treatment permitted a comparison of the Access data with the original L.F.& C. results.

Selection of the appropriate tests. The L.F.& C. study involved just four measures: Verbal, Reasoning, Number, and Space. The first analysis performed on the Project Access data used those tests, of the nine in the battery, which seemed to be most similar to the factorial composition of the tests used in the L.F.& C. study. Fortunately this proved to be a rather simple task, since the Access battery contained tests which approximated these four rather closely. To represent Verbal, the 30-item Vocabulary test was available; for Reasoning, the 25-item test entitled Letter Groups, a measure of inductive reasoning, was employed; for the measurement of Number, the 50-item Mathematics test (consisting of quantitative comparison items); and for Space, the 18-item Choosing a Path test, a measure of Spatial Scanning. The Letter Groups and Choosing a Path tests are described in French, Ekstrom, and Price (1969). The entire test battery is described in some detail in Appendix A of this report.

Results

Using these four measures from the Project Access battery, then, the "balanced" group means and standard deviations were produced and graphed in Figure 1. Although the previous studies found no sex differences, the sample sizes in the present case were large enough to permit separate analyses by sex, and this was done. The results for males appear in

Figure 1. For comparison, the results of the L.F.&C.study (for both sexes combined) are reproduced adjacent to the Project Access data.

Insert Figure 1 about here

Discussion of Figure 1

The similarity between the patterns displayed on the two sides of Figure 1 had not been anticipated. Careful inspection of the individual lines shows a similarity of pattern for the two Black groups, for example, with Verbal highest, Reasoning next, Space next, and Number the lowest. The Oriental graph of the left-hand side also looks similar to the Chinese graph of the right-hand side, and the Mexican-American results on the left are similar to those of the Puerto Rican on the right. The most dissimilar are the two remaining lines, that produced by the Access students designating themselves as "White" and those children in the L.F.& C. study designated as "Jewish."

These results are particularly surprising when the nature and number of apparent divergencies in the data are considered: the four ethnic groups are not the same in the two analyses, though there are obvious relationships between particular pairs; the age span between the two studies is about 10 years, over a period in life in which great development and change might be expected; further, these four measures are only approximations of each other in the two studies. Yet in spite of the dissimilarities, the analyses show that the pairs of ethnic groups which have obvious relationships between them are those which display similar patterns in the two studies.

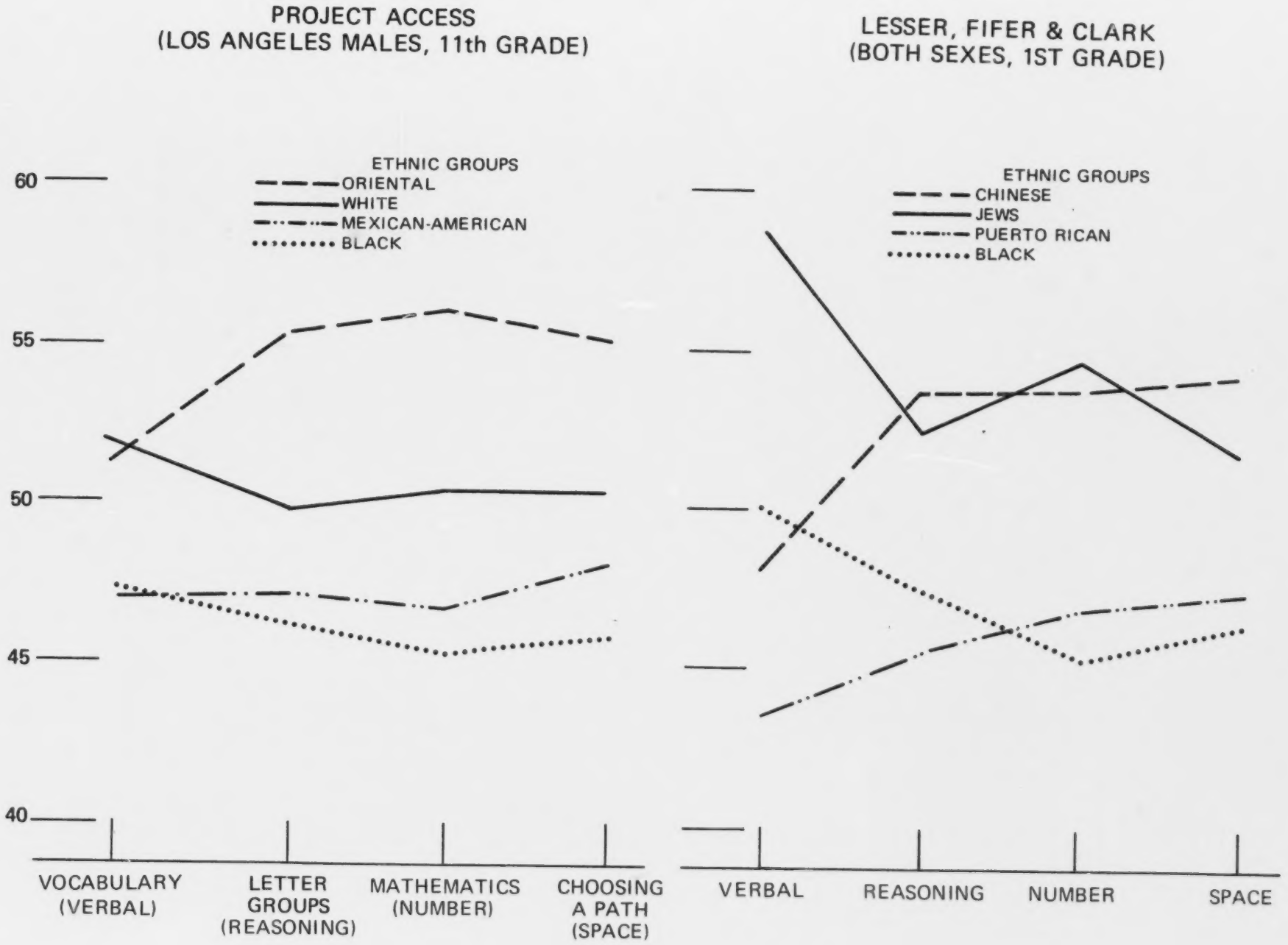

Figure 1. Results from Project Access and Lesser, Fifer, and Clark compared: patterns of test performance for males from each ethnic group.

The same "balancing" adjustments were applied to the data of the female students from Project Access, and these results were also graphed and compared to the L.F.& C. study. The results appear in Figure 2.

Insert Figure 2 about here

Discussion of Figure 2

The data from the adjusted Los Angeles female population appear on the left-hand side of Figure 2, and the L.F.& C. data, identical to that presented in Figure 1, appear on the right-hand side of this figure.

Inspection and comparison of the two results show that, although the similarity between these two graphs is noticeable, the effect is not as dramatic as in the case of the males. However, with the possible exception of the White versus Jewish comparisons, there is no question about the persistence of the pairing off of the particular groups in this analysis.

Study II

A second aspect of the research findings which inspired this analysis concerned the effects of social class on the patterns of test performance, namely, that the patterns associated with a particular ethnic group remained unaltered despite changes in social class, but that changes in social class were associated with changes in the overall level of that unaltered pattern. Since some rough indices of social class were contained in the Biographical Inventory of the Project Access data, an attempt to duplicate these findings was made.

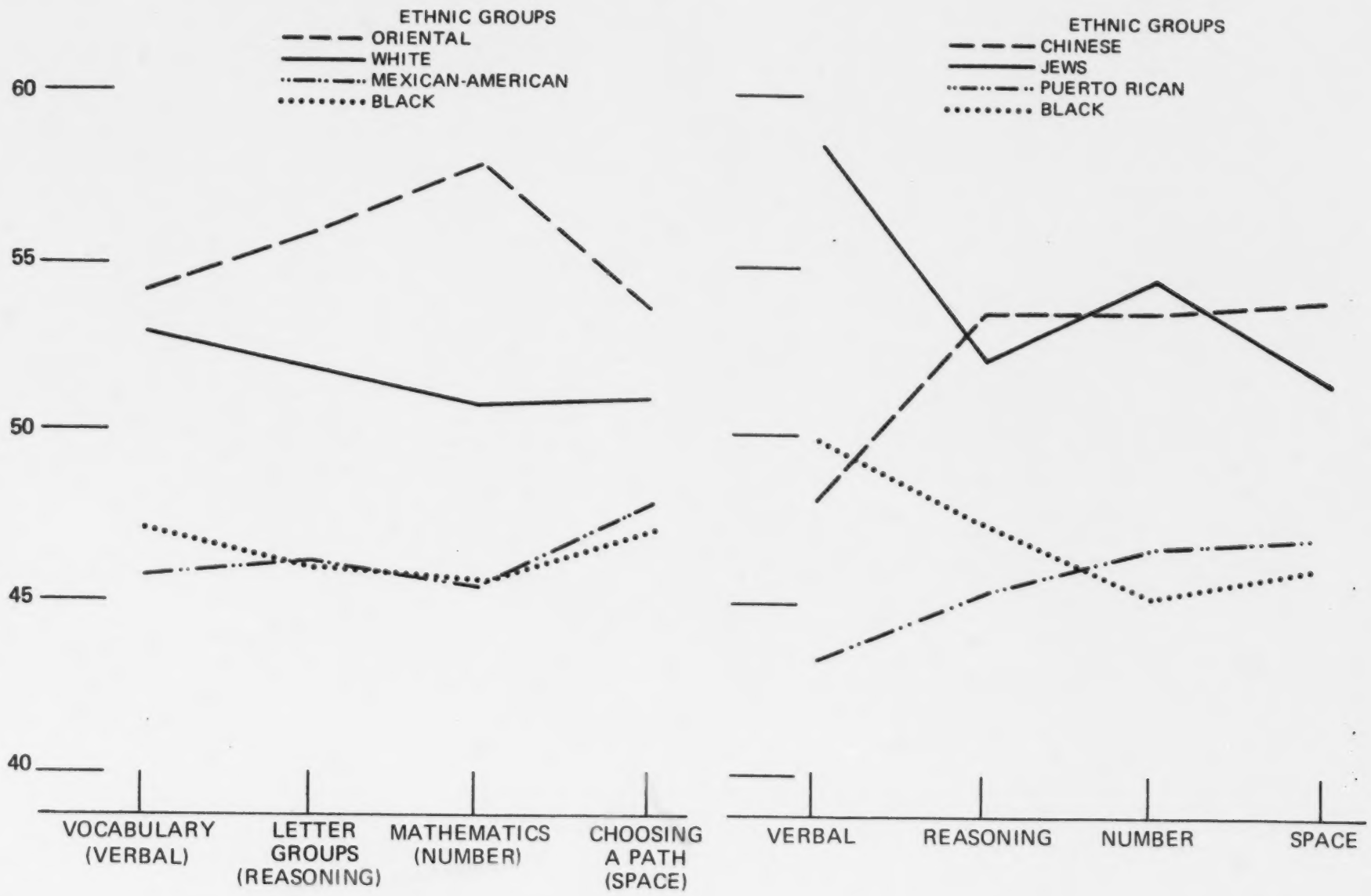

Figure 2. Results from Project Access and Lesser, Fifer, and Clark compared: patterns of test performance for females from each ethnic group.

Method

The Los Angeles students had been given an opportunity, but not required, to respond to an item in the inventory concerning parents' occupation. It was this item that could be used as a means of investigating social class effects upon test performance. The item in its entirety is quoted below. The options are arranged here from low to high as they were scored, although on the inventory itself they were placed in random order.

> Rank 1. Laborer, Factory Worker, Service or Household Worker: such as filling station attendant, longshoreman, maid, waiter, barber, beautician.
>
> Rank 2. Clerical or Sales person: Such as bank teller, bookkeeper, sales clerk, real estate salesman, secretary, stenographer, typist, receptionist, keypunch operator, switchboard operator.
>
> Rank 3. Civil Service worker: such as policeman, fireman, postman.
>
> Rank 4. Foreman Craftsman, Skilled worker: such as chef, carpenter, factory foreman, baker, machine operator, electrician, enlisted man in the armed forces, mechanic, bus driver, truck driver, meat cutter, plumber, repairman, nurse's aide, bartender.
>
> Rank 5. Owner or Manager: such as business manager, store owner, store or office manager, sales manager, contractor, executive in a large company, government official.
>
> Rank 6: Professional man or Technician: such as minister, accountant, dentist, engineer, doctor, lawyer, teacher, medical technician, librarian, nurse, pharmacist, social worker, computer programmer, officer in the armed forces.

Those marking "housewife," which was also an option, or "I don't know" were excluded from the analysis. A large number of students did not choose to complete this item, which reduced the size of the groups that could be included in the analysis. Some success in building up the size of the groups was realized by taking as the student's score either Mother's or

Father's occupation. When the student had in fact responded for both parents, the higher of the two scores was chosen.

For purposes of the present analysis, the lowest three rankings were combined into one group and designated as "Low SES," and the upper three rankings were combined and designated as "High SES." The numbers thus obtained for each category in each ethnic group are listed in Table 2.

Insert Table 2 about here

It is obvious that once again this analysis involves a number of assumptions and rough approximations that can be expected to interfere with a direct comparison with the L.F.& C. results: the numbers of students included in this social class part of the study is smaller, largely due to allowing the students the option of not responding to either, or both, of the background items; secondly, the student-reported measure of parental occupation is a quite rough index of the social class concept; third, since Project Access students were deliberately chosen from the lower income groups, the range of social class represented in the study was necessarily small.

Further quantitative problems were involved in attempting to approximate the previous results. Since these new groupings were severely reduced in size from the original groups, the group means could not be expected to be as stable as those in Study I. It was determined, therefore, that the most reasonable approach would be to employ the conversion parameters derived in Study I for the present analysis. For example, the conversion parameters that were used to change the Black group's raw score on the Vocabulary test to a mean of 50 and a standard deviation of 10 in Study I were now applied

Table 2

Numbers Contained in High and Low SES Groups

SES Level	Race	Sex	N
High	Black	Male	496
		Female	833
Low	Black	Male	218
		Female	348
		Total Black	1895
High	White	Male	70
		Female	87
Low	White	Male	41
		Female	27
		Total White	225
High	Mex-Amer	Male	173
		Female	215
Low	Mex-Amer	Male	165
		Female	143
		Total Mex-Amer	696
High	Oriental	Male	108
		Female	123
Low	Oriental	Male	31
		Female	31
		Total Oriental	293

to the raw-score means of both the high and low Black groups. The general pattern found in Study I was thus maintained, and comparison with the L.F.& C. results was as close as the nature of the data permitted.

Results

Figures 3, 4, 5, and 6 show the results from the male groups of Black, White, Mexican-American, and Orientals, respectively. Figures 7, 8, 9, and 10 show the results for the female groups.

Insert Figures 3 through 10 about here

Discussion of Figures 3 through 10

Eight figures are presented, four containing the results for males (Figures 3 through 6) and four containing the results for females (Figures 7 through 10). Each figure contrasts the high and low SES groups, within that sex and ethnic group, across the four basic ability areas. Thus, in Figure 3 it can be seen that the higher SES group of Black males performed better in each of the four areas than did the lower SES Black males, and that the essential pattern of performance noted in Study I seems to be generally maintained.

The superior performance of the higher SES group, and the general maintenance of the established pattern, appears at all four points in five of these eight figures: Black, White, and Oriental males (Figures 3, 4, and 6), and Black and White females (Figures 7 and 8). In the remaining figures, some reversal of the SES groups occur: lower SES Mexican-American males perform better than higher SES males (Figure 5) in three of the four areas (Verbal, Reasoning, Number), and Mexican-American females and Oriental females

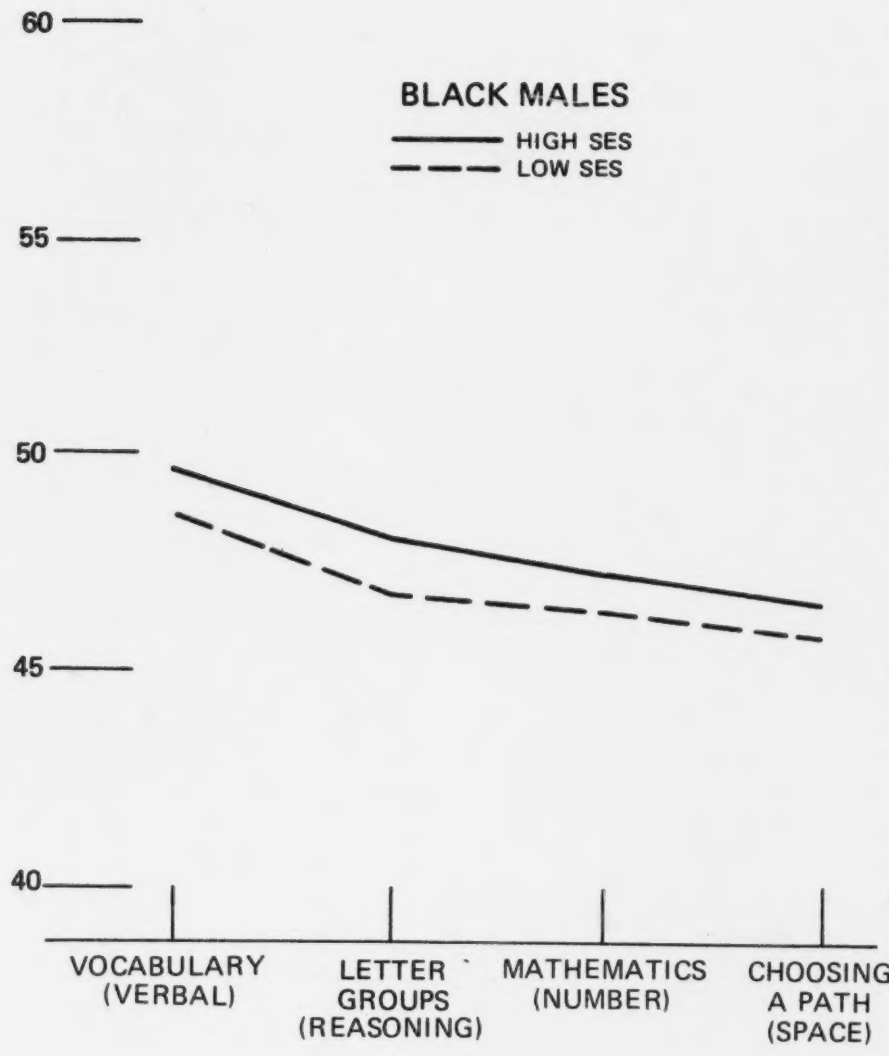

Figure 3. Patterns of test performance for Black males grouped by SES.

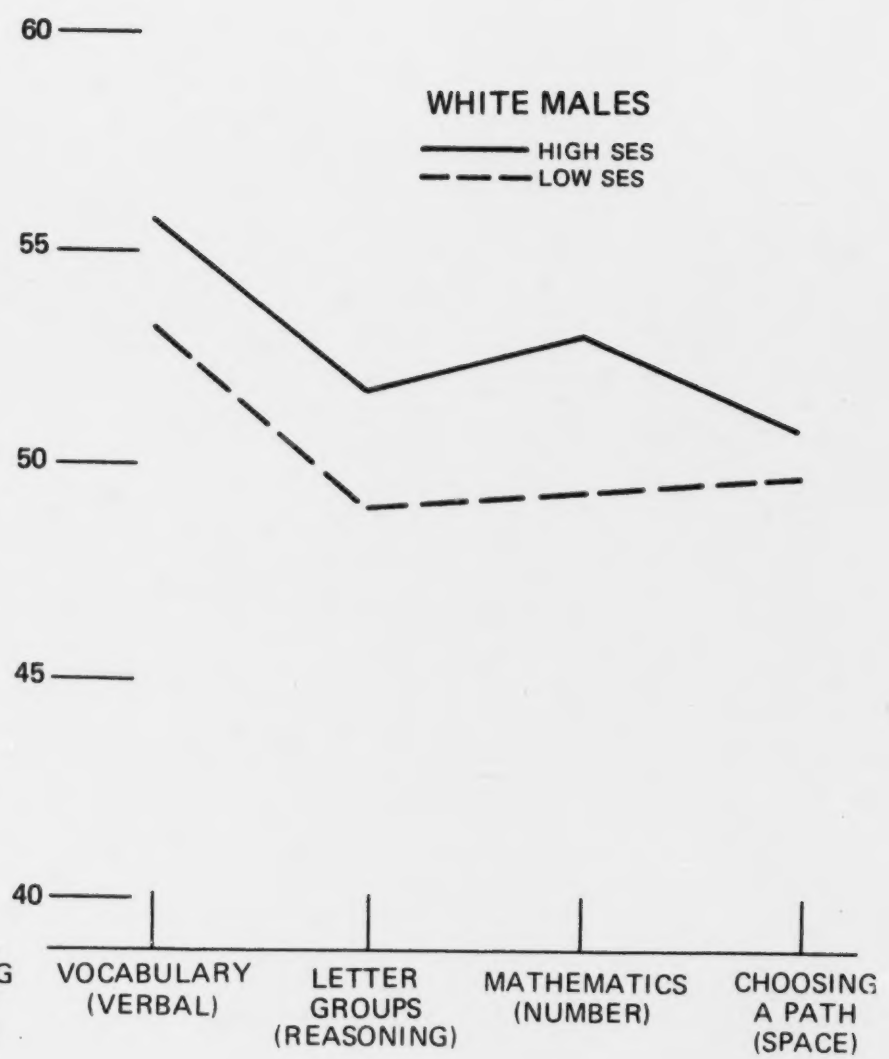

Figure 4. Patterns of test performance for White males grouped by SES.

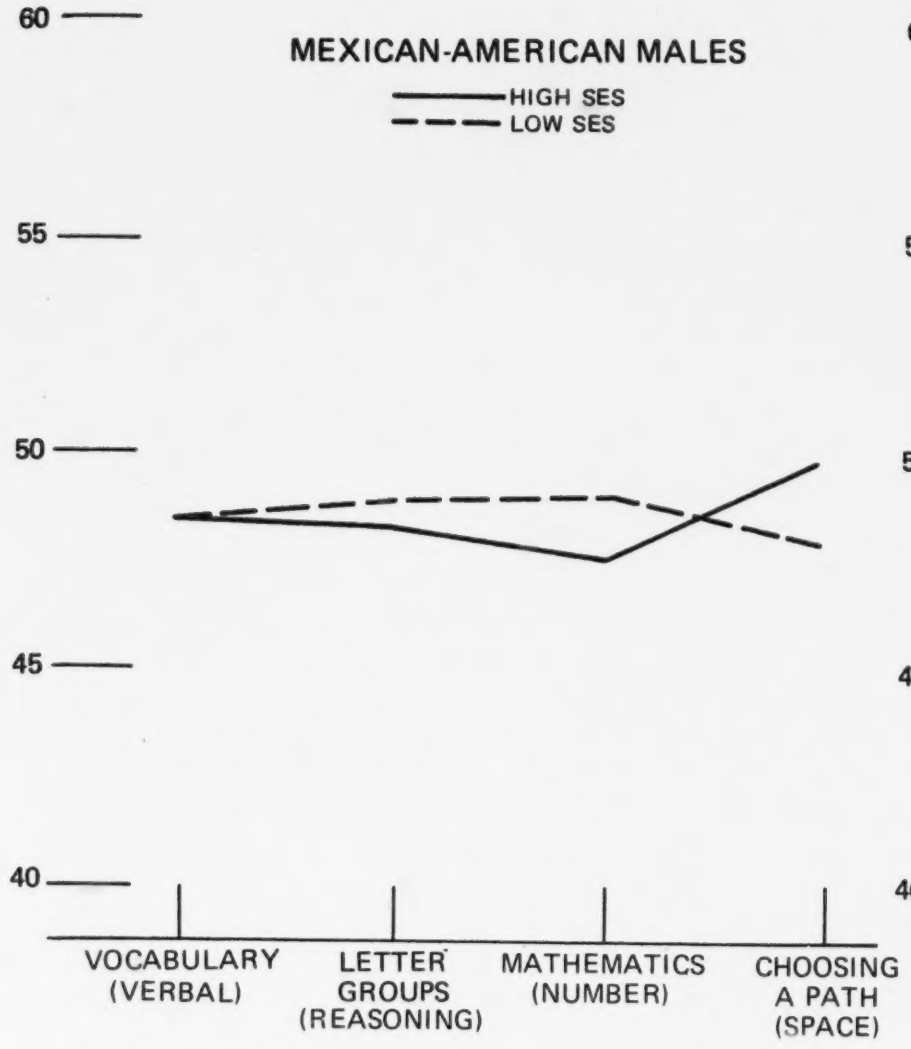

Figure 5. Patterns of test performance for Mexican-American males grouped by SES.

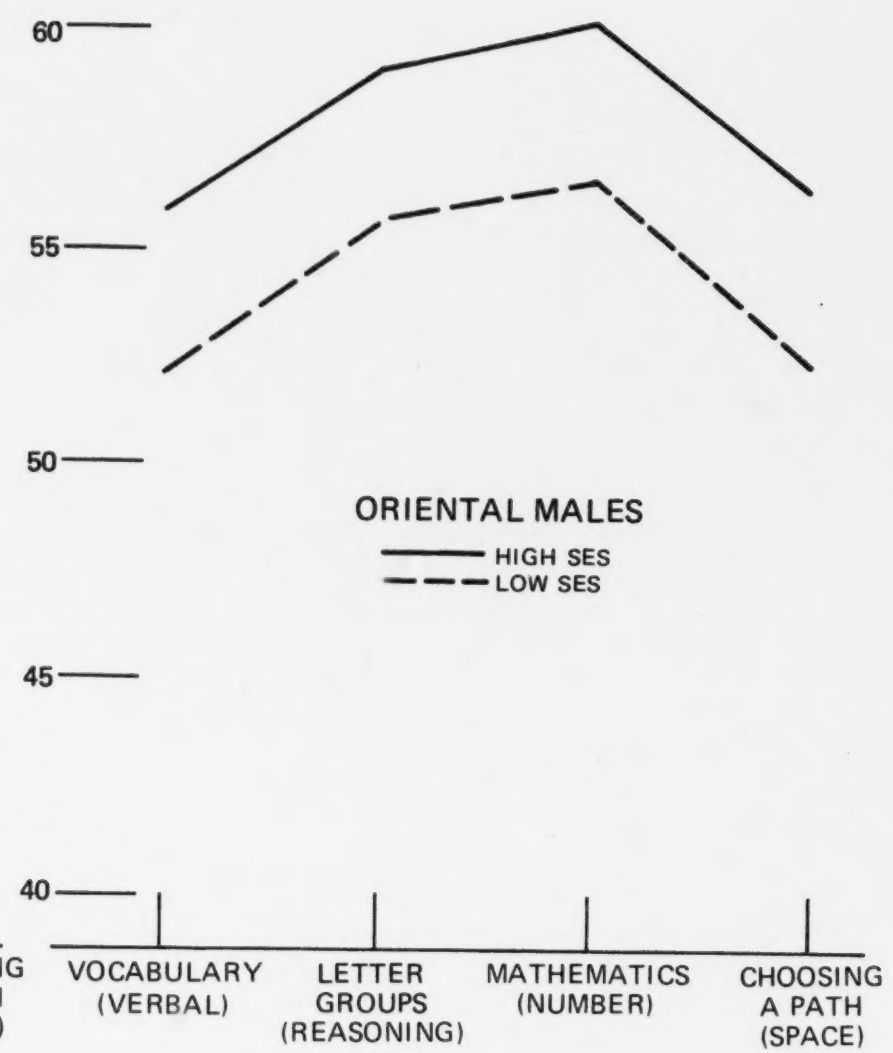

Figure 6. Patterns of test performance for Oriental males grouped by SES.

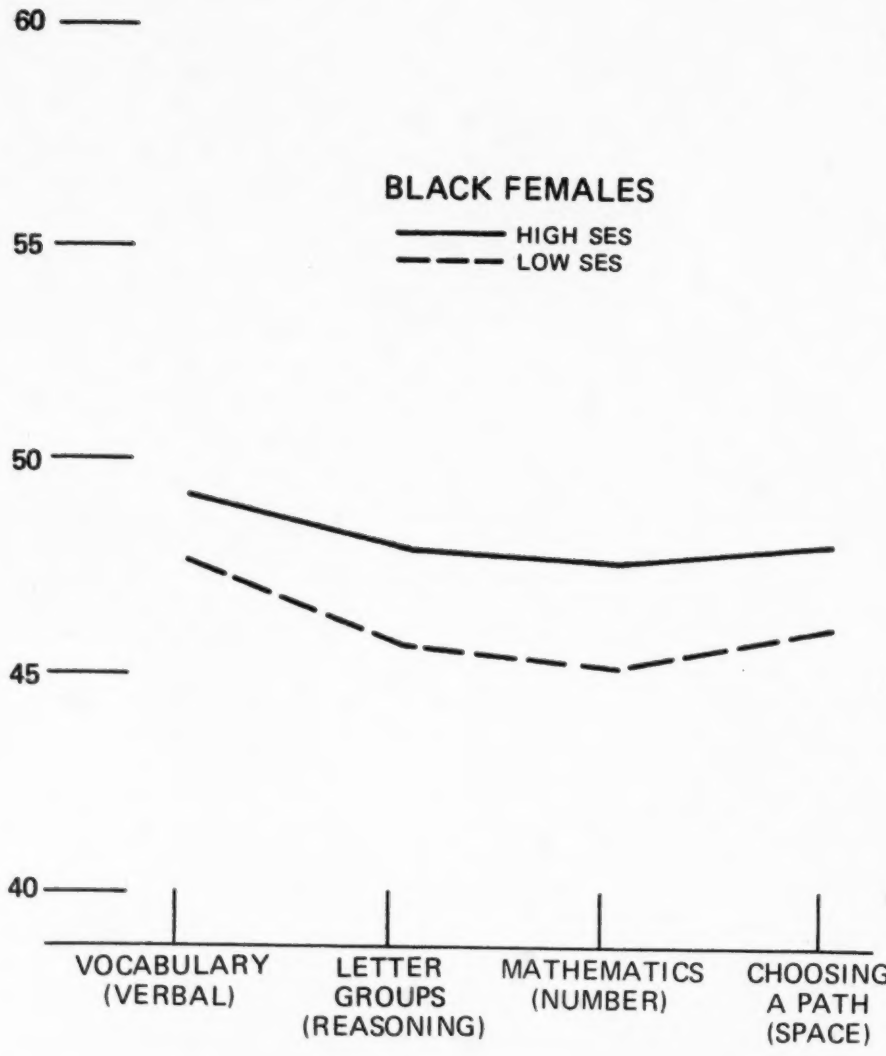

Figure 7. Patterns of test performance for Black females grouped by SES.

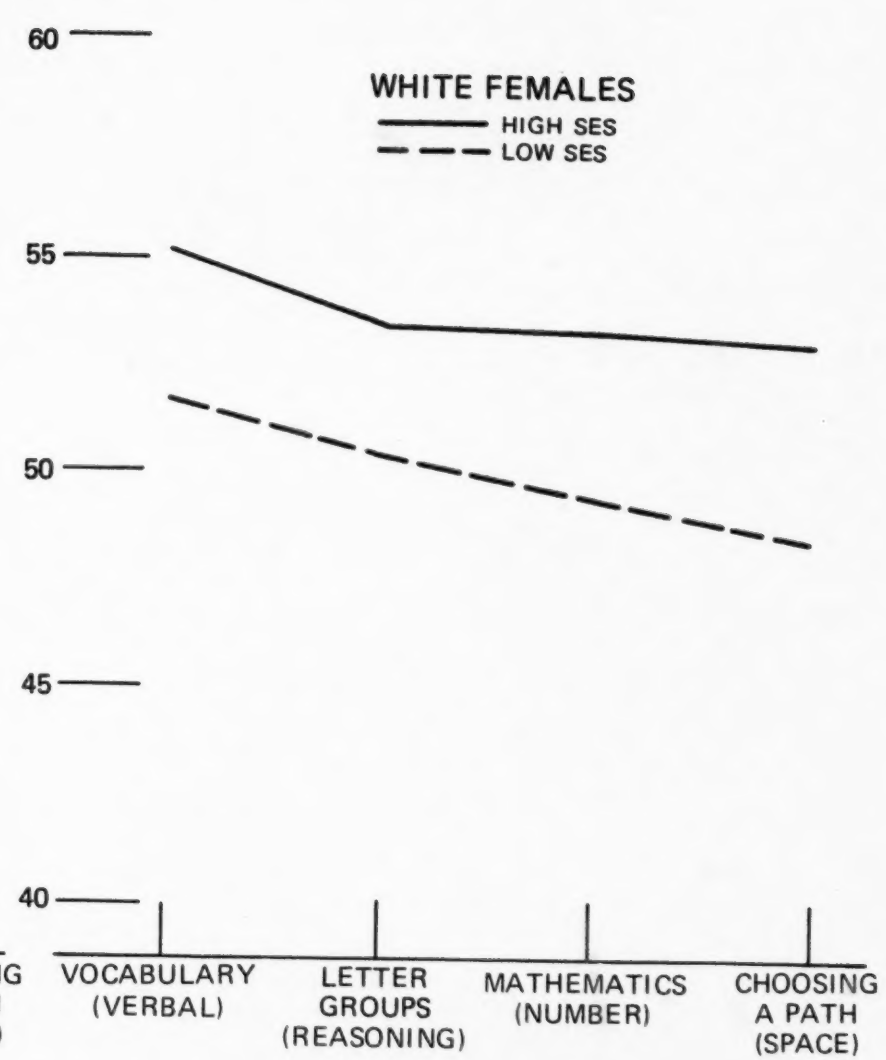

Figure 8. Patterns of test performance for White females grouped by SES.

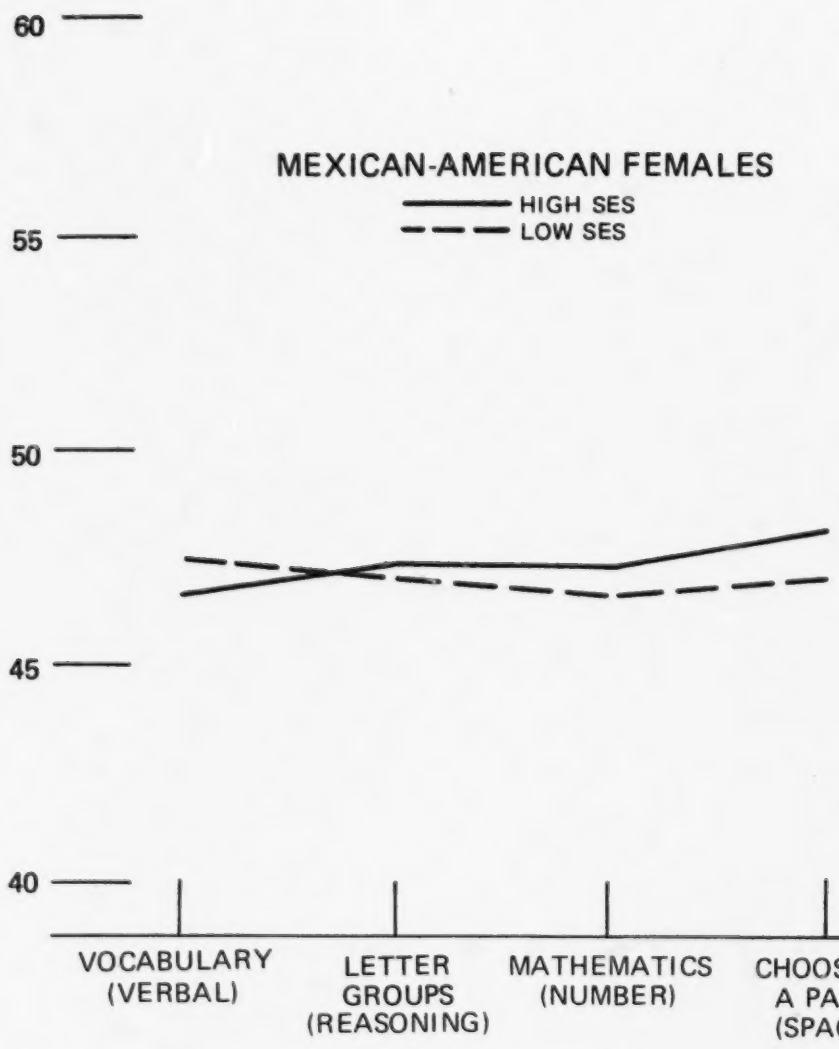

Figure 9. Patterns of test performance for Mexican-American females grouped by SES.

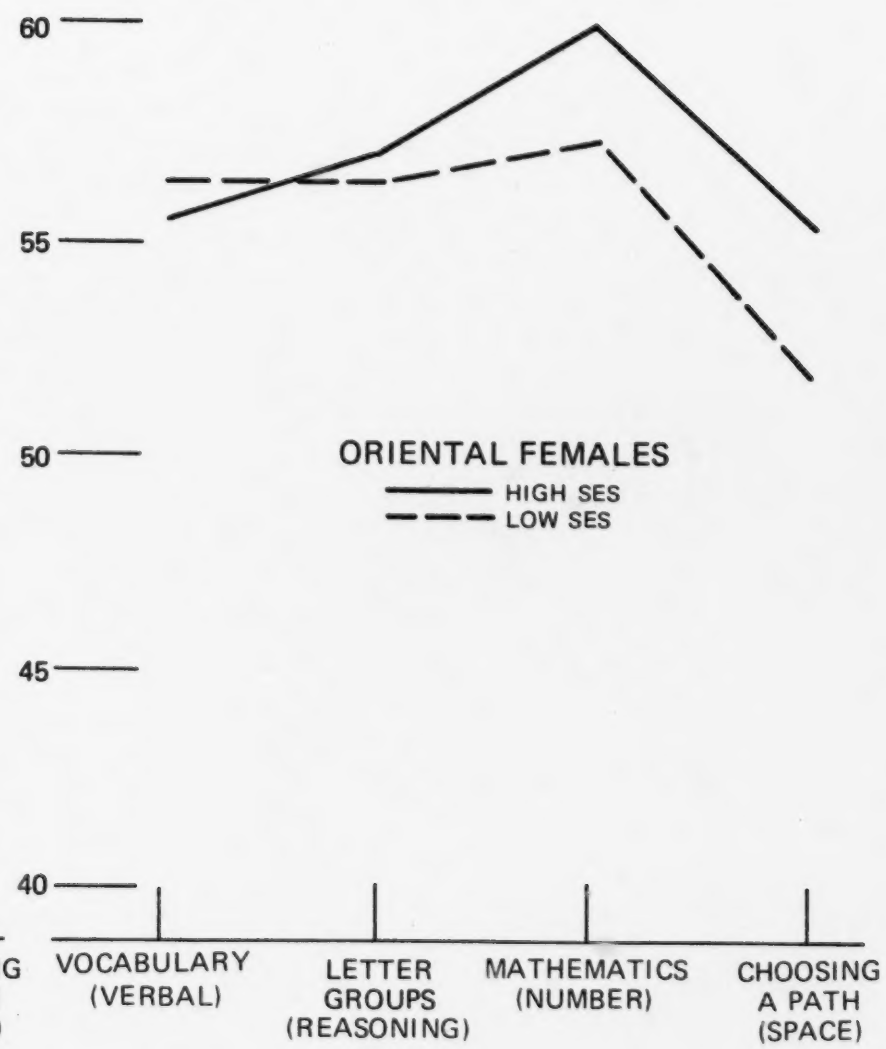

Figure 10. Patterns of test performance for Oriental females grouped by SES.

show reversals on Verbal alone. The patterns appear to be fairly consistent except in the case of lower-SES Mexican-American males, whose performance on the space measure is atypically poor. For the most part, however, the patterns remain consistent and conform to the results of the earlier studies.

A final point should be made to assure proper interpretation of these last results. In the L.F.& C. study, the examination of the effects of social class amounted to the verification of two distinct hypotheses; first, that of the influence of social class on the level of test performance; secondly, that of the viability, or persistence, of the ability patterns within the ethnic groups. In Study II, however, it was not possible, because of the nature of the data and the restricted group sizes, to test this viability in a manner similar to L.F.& C.; rather, only the former hypothesis, that of the effects of social class, was directly involved, while the patterns were to a large degree built into the results by the use of the constants from Study I. It can accurately be said, however, that Study II provided some additional evidence that SES, even crudely measured, does indeed relate to the level of test performance. The various exceptions to this rule may be the result of an absence of the effect, or they may well be due to the lack of precision in the measure of SES on which the groups were formed.

Study III

Studies I and II in this report were specific attempts to imitate the methodology and content of the L.F.& C. research. In this third section of the report, data are reported which extend the methodology to additional content, that of the remainder of the Access test battery.

Method

The five remaining tests in the battery were: Reading, a 35-item measure of comprehension of passages of literary and expository writing; Sentences, 40 problems in grammar, usage, diction, idiom, capitalization, and punctuation; The Year 2000, a 20-item test of following complex directions accurately; Figure Analogies, 25 nonverbal analogy items, composed of small designs and figures; and Picture-Number, a 30-item, two-part measure of associative memory between drawings and two-digit numbers.

Precisely the same techniques that were employed and described in Studies I and II were applied to the results from these additional tests.

Results

The results from the four previously described groups of male students appear in Figure 11, and the results from the four groups of female students appear in Figure 12. The effects of SES on these measures were also examined, once again using the technique described in Study II, and the results for males appear in Figures 13, 14, 15, and 16. Only male groups were used in the latter analysis for reasons of economy.

Insert Figures 11 through 16 about here

Discussion for Study III

The flattened profiles revealed in Figures 11 and 12 are far less dramatic than those associated with the attempted duplication of the L.F.& C. results, indicating that the variability in patterns between ethnic groups is not as great on these measures as on the measures used by

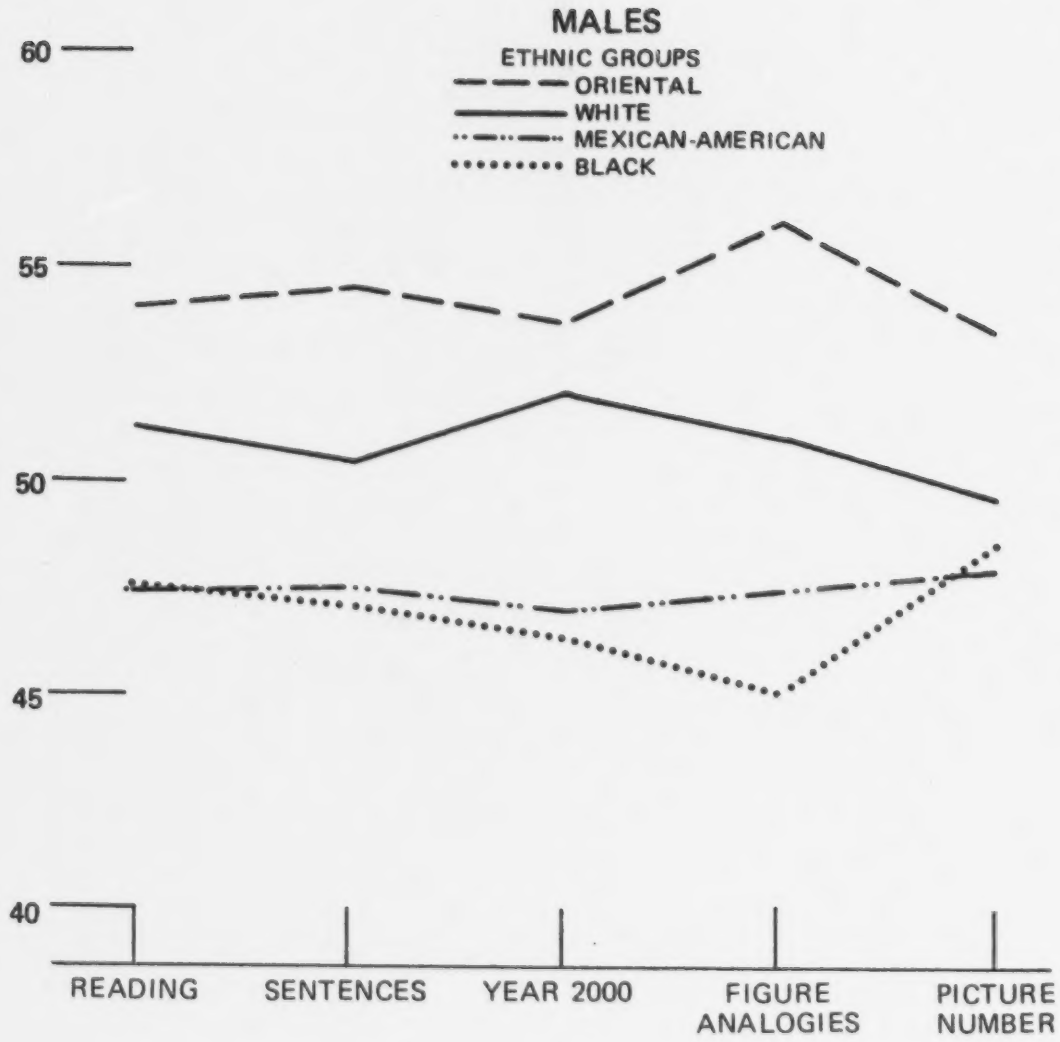

Figure 11. Additional test performance patterns for males from each ethnic group.

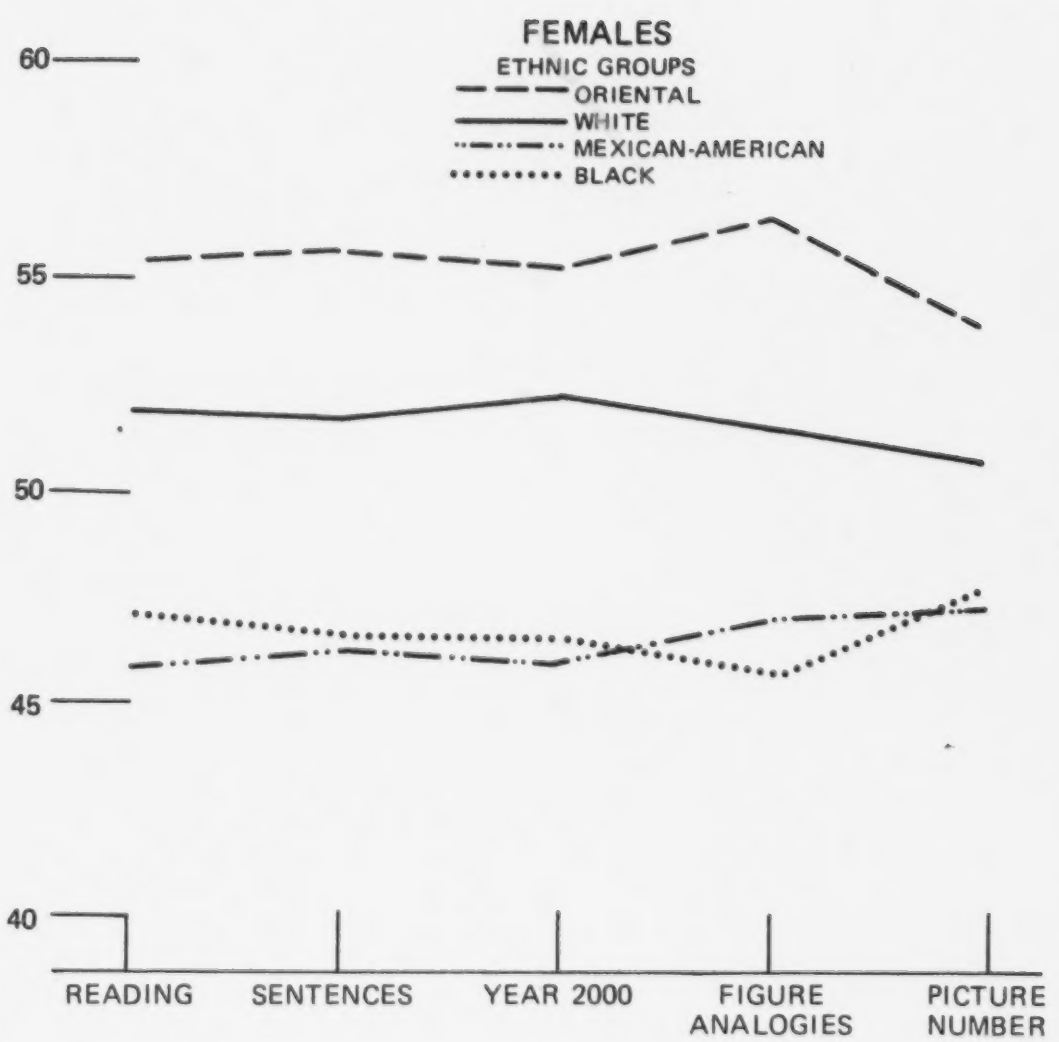

Figure 12. Additional test performance patterns for females from each ethnic group.

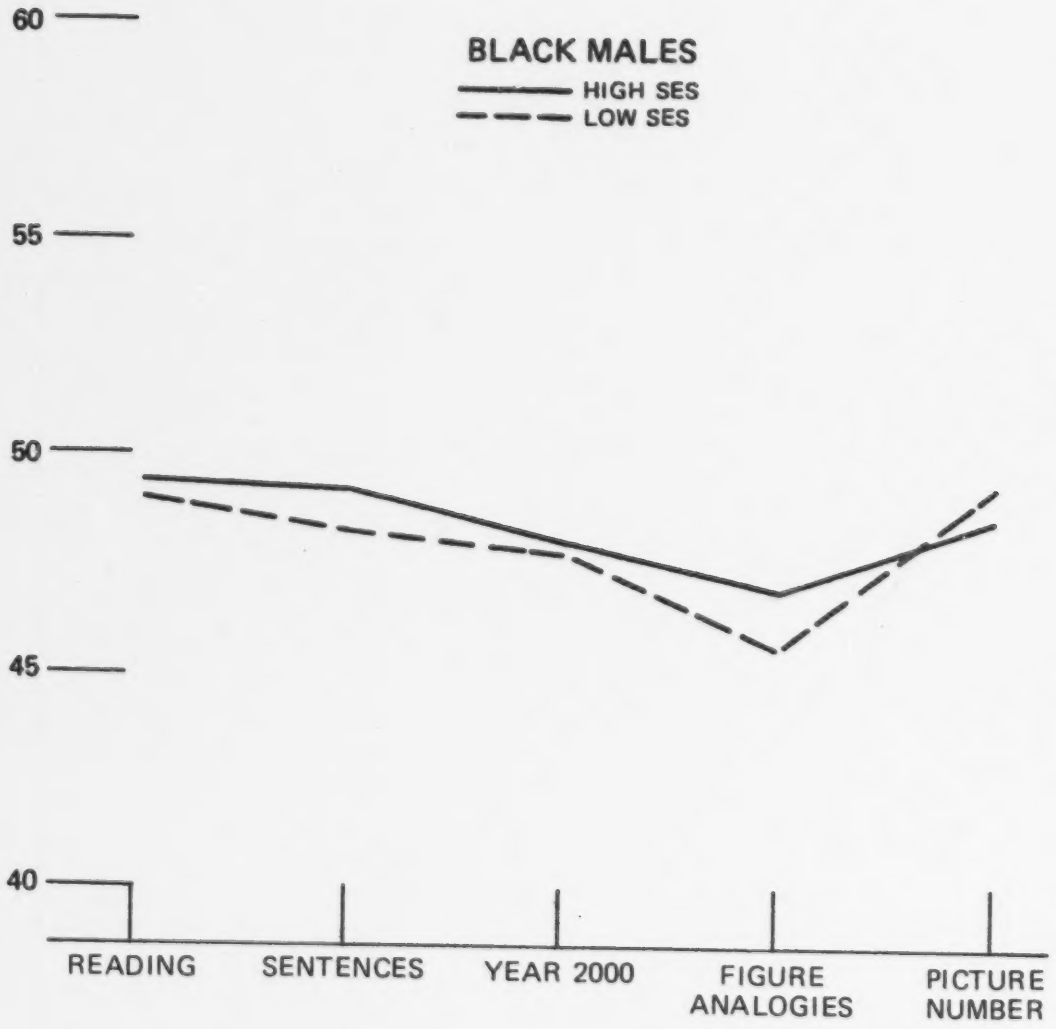

Figure 13. Additional test performance patterns for Black males grouped by SES.

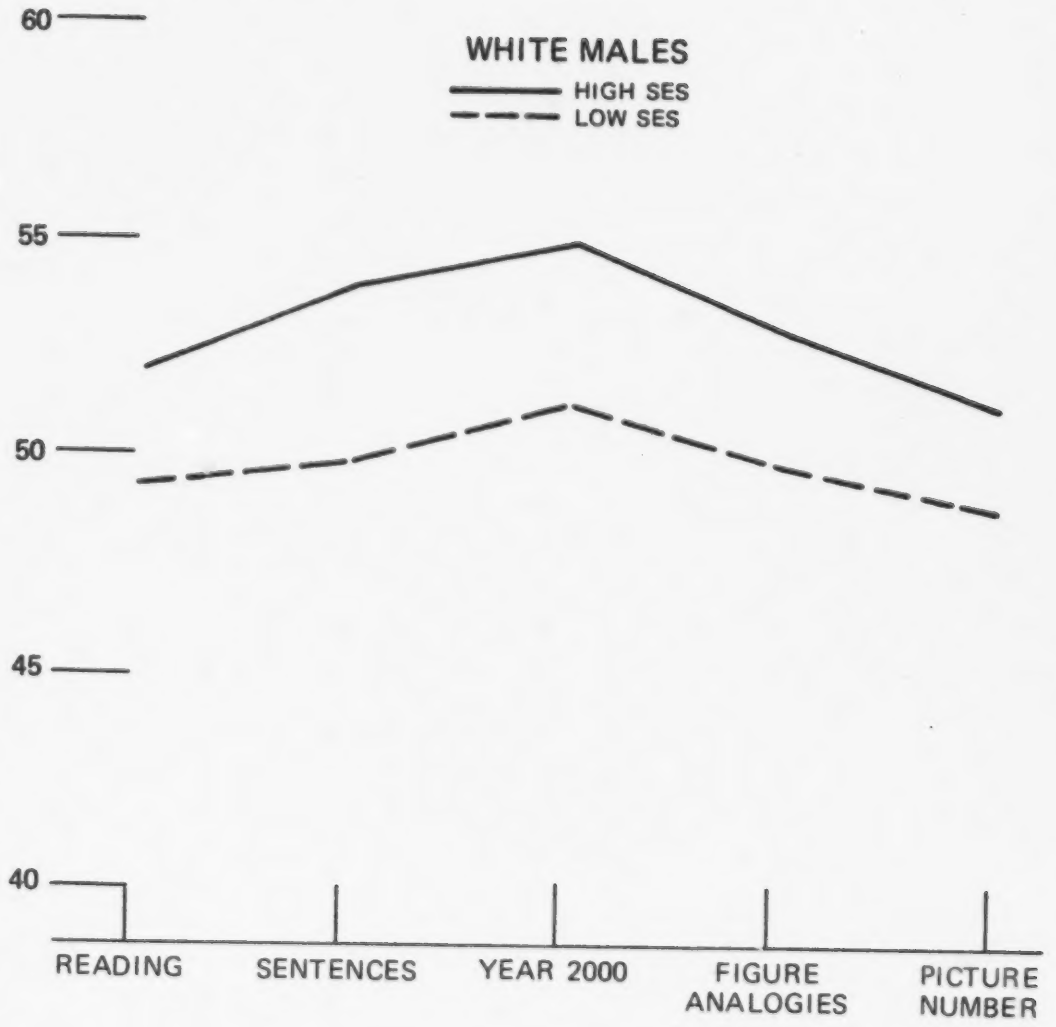

Figure 14. Additional test performance patterns for White males grouped by SES.

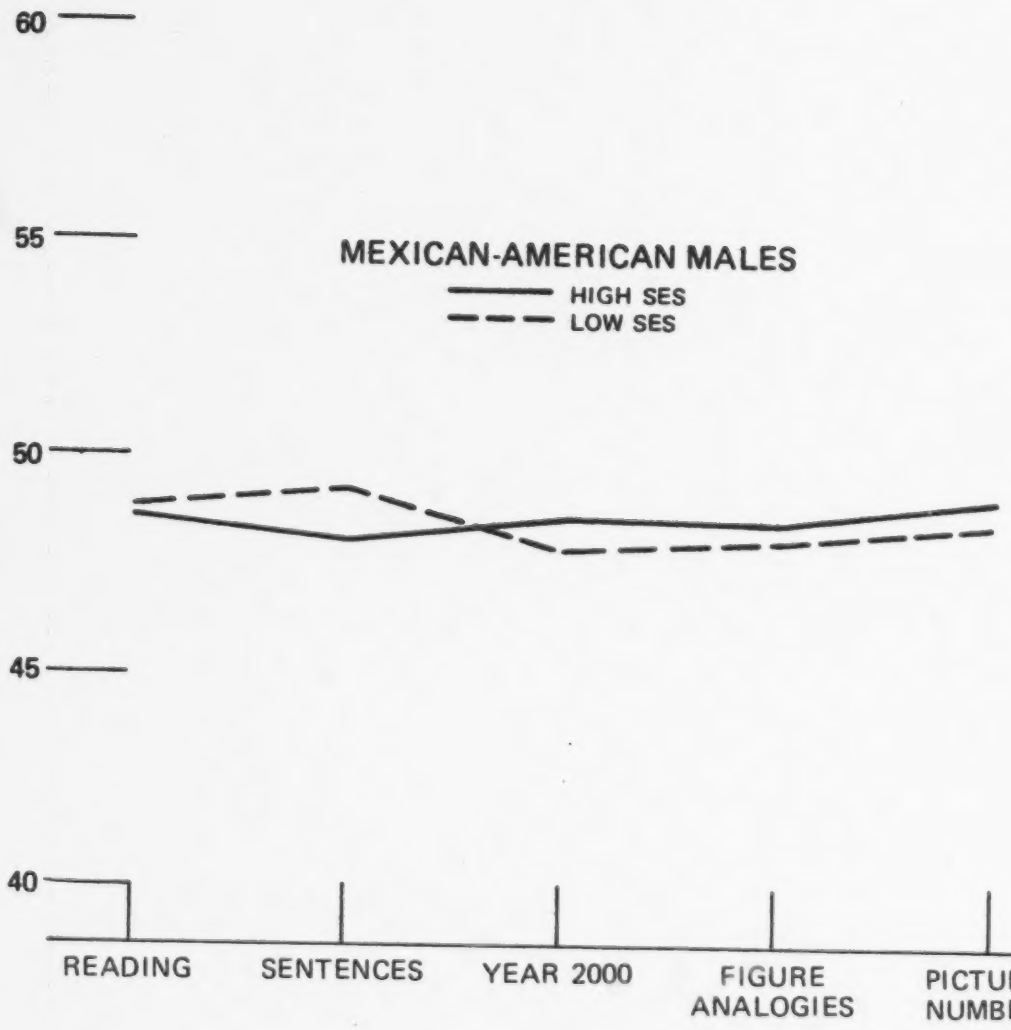

Figure 15. Additional test performance patterns for Mexican-American males grouped by SES.

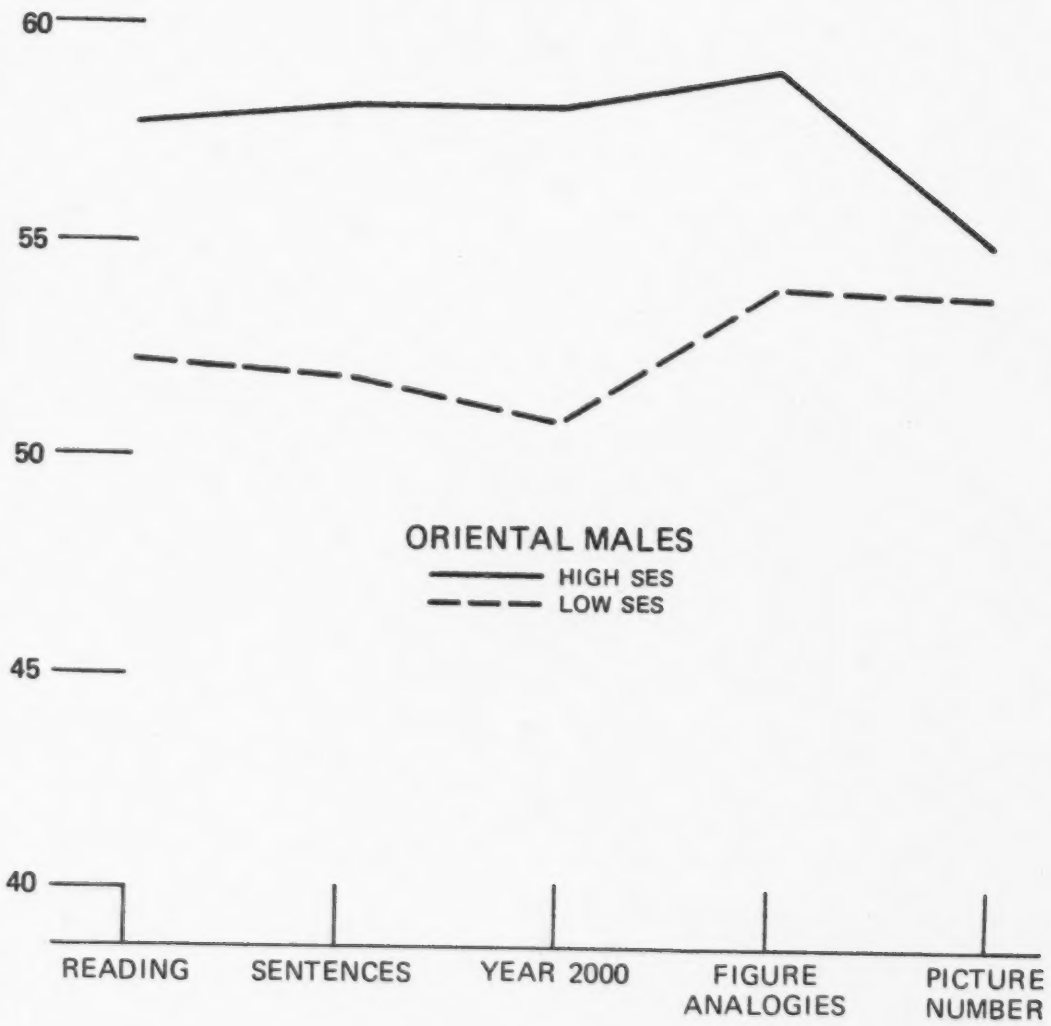

Figure 16. Additional test performance patterns for Oriental males grouped by SES.

L.F.& C., or their approximations used in Studies I and II. However, comparison of the two figures (11 and 12) shows once again that these patterns are consistent within ethnic group, regardless of sex. This is further evidence of the viability of ethnic patterns.

Some aspects of these results deserve additional comment, such as the distinct and consistently higher mean test performance of the Oriental group. This may be a reflection of the social class level of the particular students involved in this study, of course, and indeed the parental occupation scale shows generally higher levels for the Oriental group. The effect is not consistent across tests, however: the Oriental group scored about the same as the White group on the one test, Vocabulary (see Figure 1), but on those measures which might be expected to relate closely to that test, such as Sentences and Reading, the mean performance of the Oriental group was higher.

Figures 13, 14, 15, and 16 also show rather flattened profiles in the comparison of high and low SES within the ethnic groups. In the L.F.& C. study, because the SES groups were carefully preselected, it was possible to examine the relative effect of SES across the ethnic groups; for example, the Black group showed wider score discrepancies than the other ethnic groups when grouped by social class. The present data do not permit such a cross-ethnic analysis, because as mentioned earlier, participation in Project Access was voluntary and SES composition of the ethnic groups was left to chance.

However, it does seem legitimate to examine the patterns within the ethnic groups themselves, and this permits a study of the relative effects of SES on the measure of associative memory, Picture-Number. This is of

interest because of three previous studies, quoted by Stodolsky and Lesser (1967, p. 553), in which paired associate learning tasks similar to this one show no performance differences between lower class and middle class groups.

In the present results, the lower SES Black males actually score somewhat better on the associative memory task than do the higher SES Black males (Figure 13); further, the Oriental groups (Figure 16) show by far the least discrepancy on that particular measure. In the case of the Mexican-American and White groups, however, the discrepancies seem to be about the same across tests. Thus, only modest support is provided for those previous findings.

General Discussion

The original intention of the data analysis described here was to extend, rather than very nearly duplicate, the findings of the studies on first grade children described earlier (Lesser, Fifer, & Clark, 1965; Stodolsky & Lesser, 1967). The four ethnic groups that happened to be captured within the data gathered by Project Access were a function of cooperation of the particular 13 high schools within Los Angeles, and not a matter of deliberate planning for this research. The particular methodology was chosen because of the importance and clarity of the findings revealed by it in two previous studies concerning differences in the pattern of test performance among several ethnic groups.

The similarity of the findings of the present study, despite only rough approximations between the measures, a wide age difference between the groups, and variations in the ethnic groups involved, can be considered as additional

evidence of the viability of the original findings of particular test performance patterns being attributable to particular ethnic groups. The second aspect of the original finding, concerning the effect of social class on the level, but not the pattern, of performance, must be considered somewhat less completely verified; however, the additional approximations that were necessary in order to explore this question within the present data could easily be the primary cause for the less than complete verification.

The answers to some particular questions posed by Stodolsky and Lesser (1967) can be addressed with these data. They ask:

> Will the major finding ..., that differential patterns of ability are related to ethnic-group differences, remain stable across age groups? That is, does ethnic-group membership continue to determine the patterns of abilities for children with increasing maturity? Do the relative strengths and weaknesses of the subjects represent different rates of learning that eventually level off to a more or less common mean for all groups, or do they indeed represent stable cognitive organizations? What is the role of school experience in modifying distinctive ethnic-group patterns? That is, do the different patterns of mental ability persist in spite of the possible homogenizing effects of schooling through the heavy emphasis on verbal forms of instruction and the de-emphasis on the use of other intellectual skills? (p. 579).

On the basis of the evidence from the present study, the answers to those questions are: Yes, the patterns remain stable across age groups, and ethnic group membership continues to determine the pattern with increasing maturity. No, these patterns do not appear to be representations of different rates of learning that eventually level off to a more or less common mean for all groups. School experiences would not appear to have much influence on these ethnic group patterns, if we can judge from the pattern similarity of

the groups in these two age groups, one at the beginning of elementary, and the other toward the end of secondary education.

The attempt to find differential patterns on additional measures, on the other hand, was not successful in the present study. Instead, a rather flat profile of the additional measures was obtained, indicating that the original studies appear to have encompassed most of the variations. The extension, of course, did not exhaust all of the possibilities, and this line of research should not be abandoned on the basis of these findings.

The authors of the previous studies have discussed the implications of their findings at some length, and these implications are emphasized by the present study. The significance seems to be greatest for instructional practices within formal education. Stodolsky and Lesser point out the two most obvious, and conflicting, methods available for dealing with differing patterns: attempting remediation, or attempting what might be called utilization through multiple instructional methods:

> The matching of instructional procedures to student characteristics could take at least two forms. One would be essentially remedial; that is, an instructional method considered suitable for all students would be settled on in advance. Therefore, only one set of prerequisite skills would have to be achieved by all students. After assessment of students the teacher's first job would be to bring all students to this one configuration of necessary minimal skills before proceeding with the preselected regimen. Although this remedial strategy would clearly improve much current practice, as there often is only one instructional method sanctioned by a school system, it is not the most desirable approach.
>
> The second approach would make use of multiple instructional methods. Certain initial patterns of skills and learnings would be associated with certain instructional procedures. Optimal matching of students to curriculum could then be executed on the basis of initial assessments. Such matching would be far more

> diagnostic and precise than the usual sort of tracking which goes on in the schools. Presently, tracking, at least in the early grades, is usually based entirely on level of student ability. Under such a procedure, student characteristics are not meaningfully articulated with curricular content or requirements. The real power of the matching procedure we are suggesting would be in the extent to which alternative instructional strategies could be generated which would be based on a complex analysis of the student characteristics and curricular contents (Stodolsky & Lesser, 1967, p. 561).

The evidence presented here indicates that if the remediation strategy is being attempted in today's schools, it does not appear to be having much of an influence on the configuration of test performance by the students. On the other hand, the exploration of multiple instructional methods as a strategy hardly needs the present evidence for justification, since it has long been known that a variety of patterns exist among school children, whether related to ethnic identity or not.

Recently, the study of proper combinations of student characteristics with type of curriculum has been given considerable attention under the rubric of "aptitude-treatment interactions" (ATI) (Cronbach, 1967). It would seem that the results of the present study do serve to underscore the importance of the ATI studies, for if the educational system is to move toward more equitable treatment of all ethnic groups, the variety of existing abilities must be determined, acknowledged, and more completely utilized in the process of education.

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Appendix

Description of Project Access and Its Test Battery

Project Access is a program sponsored by the College Entrance Examination Board and funded by the Ford Foundation. It has as its goal the providing of access to postsecondary education for minority/poverty students, while applying the knowledge gained in this endeavor to other testing and measurement activities that affect these students. In the 1969-70 school year, a nine-test Project Access battery was administered, together with a Biographical Inventory, to approximately 18,000 junior-year students in three cities: Los Angeles, Memphis, and Washington, D. C. Not all schools in each city participated. They were chosen within the city on the basis of interest and willingness to participate.

The nine aptitude tests included in the battery were as follows:

Vocabulary, 30 synonym items, 15 minutes. Word meaning is measured.

Letter Groups, 25 items, 15 minutes. Five sets of four letters each are presented, the task being to find the rule which relates four of the sets to each other and to mark the one which does not fit the rule.

Mathematics, 50 items, 30 minutes. The quantitative comparison type of item was employed, involving the comparing of pairs of mathematical quantities to determine equality, or direction of inequality.

Choosing a Path, 18 items, 10 minutes. Spatial Scanning is measured. Each item consists of a network of lines as in an electrical-circuit diagram having many intersecting and intermeshed wires with several sets of terminals. The task is to trace the lines and to determine for which pair of terminals there is a complete circuit. There is some orderliness

in the layout to encourage comprehension of the pattern by scanning rather than simple visual pursuit of lines.

Reading, 35 items, 25 minutes. Straight reading comprehension items on presented short stories and articles.

Sentences, 40 items, 20 minutes. Detection of errors in written passages, involving language, punctuation, and capitalization.

Year 2000, 20 items, 10 minutes. A test of following complex directions, demonstrated by finding certain days on a calendar for the year 2000.

Figure Analogies, 25 items, 10 minutes. Analogy items composed of small geometric designs and figures.

Picture-Number, 30 items, 10 minutes. A two-part measure of associative memory between drawings and two-digit numbers.

In addition to the tests, a 15-minute biographical inventory asked information about ethnic identity, sex, aspirations, school grades, interests, and socioeconomic status.